

The Improved Response Program

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INTRODUCTION

In March 1995, members of the Aum Shinrikyo Japanese cult attacked the Tokyo, Japan, subway system with sarin nerve agent. The incident captured international attention and sensitized world leaders to the threat of terrorist use of weapons of mass destruction (WMD). The threat of chemical and biological terrorism is increasing. The knowledge needed to produce deadly chemical and biological (CB) agents is more readily available than ever before. The death and disruption that can be caused by such agents is the professed goal of terrorists.

Recognizing this increasing threat and not waiting until a chemical or biological terrorism disaster had already occurred, the 104th Congress of the United States passed Public Law 104-201, the National Defense Authorization Act for Fiscal Year 1997. This Act contained Title XIV—*Defense Against Weapons of Mass Destruction*—which provided for preparedness training against WMD for our nation's first responders. Because the Department of Defense (DoD) is experienced in defending against chemical and biological agents, Section 1415 of Title XIV stated, "The Secretary of Defense shall develop and carry out a program for testing and improving the responses of federal, state, and local agencies to emergencies involving biological weapons and related materials and emergencies involving chemical weapons and related materials." As a result of this legislation and in support of DoD, the U.S. Army Soldier and Biological Chemical Command (SBCCOM) developed an improved response program (IRP).

The IRP is a multiyear analytical program designed to identify and demonstrate the best practical approaches to improve the overall preparedness of the United States to respond to domestic acts of terrorism involving CB or CB-related materials. This article describes the IRP's mission, major products, and future.

IRP MISSION

The U.S. military has unique national resources in CB defense technologies and concepts. The IRP is designed to

leverage these resources to enhance the overall preparedness of civilian emergency responders and managers to respond to and mitigate the consequences of a domestic CB terrorist event. As such, the IRP maintains a partnership between military CB experts and civilian responders and emergency managers at the federal, state, and local levels. Civilian participants represent functional specialties including emergency management, law enforcement, fire fighting, emergency medical services, hazardous-materials management, and public health.

Using this diverse cross section of participants, the IRP has identified, prioritized, and developed solutions to the most pressing response issues associated with domestic CB terrorism. By engaging a nationally representative group of civilian emergency managers and responders from the program's inception, the IRP has retained an analytical focus bounded by the real-world needs of these civilian response professionals.

BIOLOGICAL AND CHEMICAL AGENTS, FUNCTIONAL DICHOTOMIES

According to the Centers for Disease Control and Prevention, one of the most significant differences between CB events is the way medical consequences will unfold over time. For instance, the medical casualties of chemical terrorism would usually be "immediate and obvious."¹ Alternatively, biological terrorism "will not have an immediate impact because of the delay between exposure and onset of illness."²

Because of these time differences in effects, chemical terrorism will usually have an identifiable incident scene while biological terrorism will not. The casualties of chemical terrorism will be readily observable, whereas the casualties of biological terrorism may not know that they are infected until days after initial exposure.

Because of these significant differences between the consequences of CB terrorism, different disciplines of first responders will be engaged in managing the consequences of each kind of incident. Chemical terrorism will likely

engage firefighters, law-enforcement personnel, and emergency medical services that converge at an incident scene. Biological terrorism will likely engage nurses, physicians, and other medical providers who treat patients at hospitals and clinics days after the initial event. Because of the different nature of consequences between biological and chemical agents, IRP analyses are focused separately in these two areas.

Biological Terrorism

The overriding consequence of a large-scale, unannounced bioterrorist attack will be the anomalous occurrence of a large number of medical casualties.³ Response systems must be capable of providing the appropriate types and amounts of medical treatments and services. However, the full spectrum of potential consequences is much broader than medical casualties.

A well-conducted bioterrorist attack will strain our nation's public-health medical-surveillance systems. It will also require responders to make quick, accurate medical diagnoses and disease identifications. By definition, a bioterrorist event is a criminal act that requires a complex criminal investigation. Depending on the agent used in an attack, such an incident could also result in residual environmental hazards that would require mitigation. Considering the potential magnitude of casualties, a significant portion of a metropolitan area's population may have to be medically managed and physically controlled. The aforementioned medical-treatment, criminal-investigation, environmental-hazard-mitigation, and population-control activities will require a coordinated and integrated command-and-control effort extending across federal, state, and local jurisdictions. In short, the full spectrum of consequences that will have to be managed encompasses multiple professional disciplines and functional areas of responsibility spanning three levels of government.

The Biological Weapons (BW) IRP Team

The above considerations influenced the makeup of the BW IRP team in fundamental ways. Because the problems inherent in a bioterrorist attack are multifaceted, the SBCCOM needed a multidisciplinary team that included participants from federal, state, and local emergency-response organizations. Recognizing the technical complexities surrounding biological weapons and terrorism, the SBCCOM also included experts in the offensive and defensive aspects of BW. The final team consisted of more than 60 federal, state, and local responders, as well as technical experts from nine states. At the federal level, 8 federal agencies, 6 Department

of Energy national laboratories, and 11 DoD organizations were represented.

Having assembled a strong team, the SBCCOM began to define broad parameters of the overall process for the BW IRP. The process first had to provide a forum to educate and inform the entire interdisciplinary and multiagency team on the offensive and defensive aspects of BW and bioterrorism. Second, the process had to yield an initial set of integrated response activities designed to manage and mitigate the full spectrum of consequences that would emerge from a large-scale, domestic bioterrorist event.

The BW IRP Process

The BW IRP process was designed around five 3-day technical workshops. Each day of the five workshops was similar in structure, but different in content.

Day one of each workshop consisted of a series of 1-hour tutorials on preselected topics such as the physics of aerosol dispersion, pathogenic microbiology of BW agents, biodetection, medical prevention and intervention, and decontamination of and physical protection against BW agents. Although the topics remained the same, the depth and complexity of the tutorials increased as the team progressed through each of the five workshops.

Day two of each workshop began with the presentation of a selected BW terrorist-attack scenario. From Workshop 1 through Workshop 5, the respective terrorist-attack scenarios increased in scale from an attack on a single building to an attack on an entire metropolitan area. After reviewing each scenario, workshop participants identified a series of specific response activities designed to mitigate the emerging consequences of the given bioterrorist-attack scenario.

On day three of each workshop, the team reviewed and integrated the complete set of response activities. The team also analyzed the integrated activities to identify response shortfalls and possible response improvements. Throughout the reviews, the team took a "bottom-up" approach and *let the problem drive the solution*.

The BW IRP Products

The BW IRP team identified a myriad of response activities spanning multiple functional areas. To be useful and understandable, these activities needed to be organized into a logical and integrated response system. Thus, the team formulated a generic bioresponse template (see chart, page 14) that embodied the concepts and work breakdown structure a city needed to respond to effectively in a bioterrorist event. This template serves

BW IRP Response Template Outline and Work Breakdown Structure

- 2.1 Public Health Surveillance**
- 2.2 Medical Diagnosis**
- 2.3 Epidemiological Investigation**
- 2.4 Mass Prophylaxis**
- 2.5 Criminal Investigation**
- 2.6 Residual Hazard Assessment
and Mitigation**
- 2.7 Control Affected Area/Population**
- 2.8 Care of Presented Casualties and
Worried Well**
- 2.9 Fatality Management**
- 2.10 Command and Control**
- 2.11 Resource and Logistical Support**
- 2.12 Continuity of Infrastructure**
- 2.13 Family Support Services**

as a useful starting point for cities and states in preparing their own local plans to respond to a bioterrorist attack.⁴

Chemical Terrorism

The SBCCOM possesses world-class technical experts who are knowledgeable in how to defend against and deal with the use of chemical-warfare agents on military battlefields, but not necessarily in civilian environments. It recognized that it would have to work closely with civilian emergency responders to identify and solve many of the unique difficulties in civilian response to chemical terrorism. Direct involvement of civilian emergency responders in the chemical weapons (CW) IRP was essential. This involvement contributed to the ready acceptance of response guidance developed by the CW IRP and made the program a success across the national emergency-response community.

The CW IRP Team

Early in the program, Baltimore, Maryland, aggressively pursued a partnership with the CW IRP. Surrounding jurisdictions—including Baltimore, Harford, Howard, and Montgomery Counties—also were anxious to participate and joined the program early. The CW IRP also works closely with the U.S. Army Medical Research Institute of Chemical

Defense. The medical expertise and extensive experience of the institute's personnel have been invaluable in all CW IRP efforts. They teach military physicians, nurses, medics, and combat lifesavers how to manage and treat chemical-agent victims. With added participation by several state and federal agencies and with individual participation from representatives of emergency-response organizations from across the nation, the CW IRP has grown into a team with diverse expertise that includes specialists in chemical weapons environmental and medical effects, fire-fighting response, law enforcement, hazardous-materials mitigation, and overall emergency management.

The CW IRP is organized into four groups that address distinct functional areas in an emergency response. These groups address law enforcement, public health and safety, emergency management, and emergency response. Each group conducts tabletop and functional exercises that help identify the difficulties encountered in civilian response to chemical terrorism. Once identified, these difficulties are addressed using a think-tank approach involving the overall CW IRP.

In developing solutions to these difficulties, the CW IRP relies on technical studies conducted by its chemical-defense experts. Solutions often involve novel applications of equipment and techniques that emergency responders already employ in other emergency situations. The CW IRP's unique combination of chemical-warfare-agent expertise and operational know-how in civilian emergency response enables it to develop improved response guidance and methods that are scientifically accurate and operationally practicable. Improved response guidance and methods often use equipment and skills that civilian responders may possess already.

To ensure that new response concepts are workable, they are operationally tested in functional exercises, demonstrating and validating their suitability. When the CW IRP's improved response guidance and methods have been fully validated and demonstrated, civilian-response jurisdictions have found that they can readily incorporate the CW IRP's information into their own local-response plans.

The CW IRP Accomplishments

Improving how civilian responders can deal with chemical terrorism requires addressing personal protection of responders, decontamination, and medical treatment of chemical-agent victims. The CW IRP team has performed technical initiatives in each of these areas and has used the results of these initiatives to develop improved guidance and methods of dealing with chemical terrorism. The SBCCOM cannot, and does not, dictate emergency-response requirements and procedures. However, with the participation of its civilian emergency-response partners, the

CML

CW IRP team provides improved response guidance and methods to the emergency-response community as a whole. Each separate jurisdiction of the emergency-response community holds the authority to adopt or reject the CW IRP's improved response guidance and methods. To date, the guidance and methods have helped many jurisdictions develop emergency-response procedures that can maintain the safety of the emergency responders while minimizing the impact of chemical terrorism and maximizing the effectiveness of emergency-response assets.

For decontamination of chemical-agent victims, the CW IRP team has examined previous research reports and studies on the removal of chemical agents from the skin and found that rinsing with large amounts of plain water is the best way that firefighters can most rapidly decontaminate chemical-agent victims. The CW IRP team has developed guidance on how firefighters can use their fire-fighting equipment to decontaminate large numbers of chemical-agent victims quickly.⁵ Fire rescue personnel were recognized as likely to encounter chemical-agent vapors during early response to a chemical terrorism event, and it was initially not known whether or not brief vapor exposures would be highly lethal to firefighters using normal personal protective equipment (PPE), including a self-contained breathing apparatus. This uncertainty threatened a fundamental firefighter mission—saving lives by rapid reaction.

The CW IRP tested firefighter's PPE and determined how much protection the equipment offers when it is used. Using this information, the CW IRP team demonstrated that firefighters could arrive on scene and proceed with recognizance and rescue, with known and minimal risk of any significant chemical-agent effects.⁶ The CW IRP team showed how firefighters can use positive-pressure ventilation fans to further reduce the risk associated with rescue in an enclosed space containing chemical-agent vapors.⁷ Firefighters often use positive-pressure ventilation fans to remove dangerous gases from buildings. The CW IRP team demonstrated that these techniques and procedures apply equally well to chemical-agent contamination.

ON-GOING INITIATIVES

The CW IRP team is currently working with the Maryland State Police special weapons and tactics teams to perform, for law-enforcement personnel, PPE assessments similar to those that have helped fire departments. This work will show the levels of protection that law-enforcement personnel will receive from various PPE systems. More importantly, these analyses will assess the risk of receiving chemical-agent symptoms from various law-enforcement missions with chemical PPE in chemically contaminated environments. This information

will allow law-enforcement personnel to match their PPE configurations and their mission activities so they can effectively manage the risks of potential chemical threats.

With outstanding support from Baltimore, the CW IRP team is developing the operational plans for an off-site triage treatment and transportation center (OST3C) to provide medical care to chemical victims. The OST3C plan is designed to keep contamination out of existing medical facilities. The CW IRP team and Baltimore are developing structural and operational plans for an OST3C and will be exercising those plans soon. An OST3C will help the community deal with large numbers of chemical victims without dangerously contaminating and having to close its valuable medical facilities. Once decontaminated and given initial medical care at the OST3C, more severe chemical victims can be safely moved to existing medical facilities.

The CW IRP team is also continuing to develop guidance on handling fatalities that might be caused by chemical terrorism and what follow-on medical care and handling would be needed for victims who suffered acute exposure to chemical agents. These efforts will help medical examiners deal with chemical fatalities safely and effectively and will better help the medical profession deal with people who may have been exposed to chemical agents.

For biological events, the BW IRP team plans to continue to validate and improve selected components of the BW response template through tests and exercises. The team planned and executed a functional test of the template's casualty-care function in November 1999. In addition to demonstrating the concept's applied validity, the test helped determine more definitive staffing and facility requirements for casualty care during a BW incident.

The BW IRP team analyzed the overall structure of the BW response template to identify the key decisions that public officials will have to make to respond effectively to a biological threat.⁸ The response template was evaluated as a total, integrated response system in three national regions. The regions were of varying populations and geographically dispersed, including Kansas, Florida, and Delaware. These evaluations provided feedback on the general applicability of the template and indicated how it could be adapted to various localities in different regions and with different population bases.

In addition, the team helped identify useful "triggers" or "flags" that could guide decision makers in determining if a covert biological attack has occurred. The BW IRP team also conducted a follow-on workshop with the Federal Bureau of Investigation, local law-enforcement representatives, and members of the public-health community

to assess the nuances associated with criminal investigation for a bioterrorist incident. A full workshop report is forthcoming and will be placed on the SBCCOM Web site at <http://dp.sbccom.army.mil/>.

Finally, the BW IRP team continues to assess response-improvement concepts. Specifically, the team is working to develop chemical and biological building-protection measures, biodecontamination techniques and protocols, subway biosurveillance technologies, emergency-response-management software, and biocasualty projection methods to assist civilian emergency managers in assessing the consequences of a bioterrorist attack.

Reports referenced in this article and all other technical reports of both the CW IRP's and the BW IRP's analyses can be found at SBCCOM's Internet Web site.

CONCLUSIONS

In a relatively short period of time, the IRP has begun to provide civilian emergency managers and first responders a logical conceptual framework that they can use as a starting point to improve their overall preparedness for responding to a domestic CB terrorist incident. Using the IRP, first responders have been able to identify actual response problems and design solutions that work in the real world. Solutions emphasized in the IRP are based on equipment and know-how already possessed by the first responders. Through follow-on activities of the IRP, these initial-response concepts will be both validated and improved.

The IRP response concepts will also be extrapolated and applied to the requirements of military installation responders and response units. From experience, the military has learned that being prepared to defend against CB warfare is the most effective deterrent to such warfare itself. The efforts of the IRP will never eliminate all CB terrorist threats. Hopefully, preparedness to defend ourselves against this kind of terrorism will lead terrorists to realize that their desired ends will not be achieved because our emergency responders are prepared and capable of effectively dealing with such incidents.

In addition to providing these tangible benefits to our nation's civilian- and military-based communities, the IRP highlights another important fact: the Army's research and development centers are a valuable national resource that can provide broad-based benefits beyond the military community. The successes of the IRP specifically underscore how Army scientists and engineers can effectively partner

with federal agencies as diverse as the Federal Bureau of Investigation, the Federal Emergency Management Agency, the Department of Health and Human Services, the Environmental Protection Agency, and the U.S. Department of Agriculture. Indeed, through the IRP, SBCCOM engineers and scientists have worked side by side with state and local representatives in functional specialties spanning law enforcement, hazardous-spill management, fire fighting, and emergency medical services. Considering the organizational and practical benefits of such partnerships, the SBCCOM feels privileged to continue working on this critical national effort.

Endnotes

¹ Centers for Disease Control and Prevention, "Biological and Chemical Terrorism: Strategic Plan for Preparedness and Response," 21 April 2000/ Vol.49/No. RR-4, 3.

² Ibid.

³ SBCCOM, "Biological Weapons Improved Response Program (BW IRP) Executive Summary," March 1999. Available: <http://dp.sbccom.army.mil/>.

⁴ SBCCOM, "Improving Local and State Agency Response to Terrorist Incidents Involving Biological Weapons – Interim Planning Guide," August 1999 (contains a more detailed description of the BW response template and its response components). Available: <http://dp.sbccom.army.mil/>.

⁵ SBCCOM, "Guidelines for Mass Casualty Decontamination During a Terrorist Chemical Agent Incident," January 2000. Available: <http://dp.sbccom.army.mil/>.

⁶ SBCCOM, "Guidelines for Incident Commander's Use of Firefighter Protective Ensemble (FFPE) with Self-Contained Breathing Apparatus (SCBA) for Rescue Operations During a Terrorist Chemical Agent Incident," August 1999. Available: <http://dp.sbccom.army.mil/>.

⁷ SBCCOM, "Use of Positive Pressure Ventilation (PPV) Fans to Reduce the Hazards of Entering Chemically Contaminated Buildings," July 1999. Available: <http://dp.sbccom.army.mil/>.

⁸ SBCCOM, "Biological Weapons Improved Response Program (BW IRP) Response Decision Tree Workshop," August 1999. Available: <http://dp.sbccom.army.mil/>.